LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

VOLUME 3 JANUARY-MARCH, 1928 NUMBER 1

JOURNAL

OF THE

Pan-Pacific Research Institution

A Periodical Record of Investigations Bearing on Problems of Food Production, Distribution, Conservation and Consumption, as well as on Public Health, and Race and Population Problems as Related to the Countries Bordering on the Pacific.

A Catalogue of the Marine Fishes of South Australia

By Edgar Waite, F.L.S., C.M.Z.
Director South Australian Museum

A Check List of the Fishes of the Santa Cruz Archipelago, Melanesia

By Gilbert P. Whitley
Australian Museum, Sydney, Australia

The Amateur Radio Scientist in the Pacific

By J. E. Strachan

AT PRESENT PUBLISHED QUARTERLY AT HONOLULU, HAWAII
BY THE
PAN-PACIFIC UNION

More frequent publication as acceptable material is contributed.

The Journal of the Pan-Pacific Research Institution

At a recent meeting of the governing body of the Pan-Pacific Research Institution the quality and scope of the papers to be published in the Journal of the Institution was discussed.

It was decided that the Journal of the Pan-Pacific Research Institution will be devoted to the publication of scientific papers only. Various subjects of interest to the countries bordering on the Pacific will be developed.

At the present time, for example, a series of papers is being prepared constituting check lists of the fish of the waters of the Pacific Ocean, including fresh water fish of the lakes and streams in Pacific lands. This work is under the general direction of Dr. David Starr Jordan, President of the Institution. Check lists of the fish of practically all the Pacific countries have either been prepared or are in the course of preparation.

Likewise, it is expected, papers will be written on entomological problems, and check lists of the insects of the several Pacific countries prepared. A general survey of economic insects of the Pacific will be published, if possible, to supplement this paper on single species, or on the enemies of particular crops will be published from time to time. When such information from various nations is correlated, the possibilities appear to be vast indeed in the way of interest and of economic importance.

Again, plant disease and plant pest problems in general will receive their due share of attention. When more information is completed in all the different countries, who knows what losses may be prevented in the way of depredations brought about by the chance importation of a plant enemy.

Studies now projected on foods of the Pacific countries bid fair to bring about new information of very great value to the health and general welfare of the peoples of the Pacific countries.

These are just a few of the many lines of scientific study that may make the Journal their medium of publication.

The governing body of the Institution has further recommended that the publication Council utilize the Mid-Pacific Magazine once a quarter, in which to publish scientific papers read at the Pan-Pacific Research Institution, in Hawaii or elsewhere, as well as contributed scientific papers of sufficient interest to warrant publication. These papers, mostly of a popular science nature, will be illustrated and the Publication Council will consider contributions. These should be addressed to the Editors, Journal of the Pan-Pacific Research Institution, Honolulu, Hawaii, U. S. A.

Check List of the Marine Fishes of South Australia

By EDGAR R. WAITE, F. L. S., C. M. Z. S.,
Director, South Australian Museum.

By permission of the Trustees of the Australian Museum

This list is based on the author's Catalogue of Fishes of South Australia (1) and includes the additions and corrections published in the Handbook of the Fishes of South Australia (2) and in the Supplement to the Catalogue (3).

ACRANIA (Lancelets).

Family 1. BRANCHIOSTOMIDÆ.

EPIGONICHTHYS Peters, 1876 (cultellus).

1. Epigonichthys bassanus Günther (Southern Lancelet).
2. Epigonichthys australis Raff (S. Australian Lancelet).

CRANIATA.

Class CYCLOSTOMATA (Lampreys).

Family 2. PETROMYZONIDÆ.

GEOTRIA Gray, 1851 (australis).

3. Geotria australis Gray (Wide-mouthed Lamprey).

Family 3. CARAGOLIDÆ.

CARAGOLA Gray, 1851 (lapicida).

4. Caragola mordax Richardson (Short-headed Lamprey).

Class PISCES (Fishes).

Sub-class ELASMORBRANCHII (Sharks and Rays).

Order SELACHII (Sharks).

Family 4. HEXANCHIDÆ.

NOTORHYNCHUS Ayres, 1855 (maculatus).

5. Notorhynchus pectorosus Garman (Seven-gilled Shark).

Family 5. HETERODONTIDÆ.

HETERODONTUS Blainville, 1816 (philippi)

6. Heterodontus Philippi Bloch & Schneider (Port Jackson Shark).

Family 6. CARCHARIMIDAE.

CARCHARIAS Rafinesque, 1810 (carcharias L.).

7. Charcharias gangeticus Müller & Henle (Sea Shark).
8. Carcharhiias macrurus Ramsay & Ogilby (Whaler).

HYPOPRION Müller & Henle, 1838 (macloti).

9. Hypoprion hemiodon Müller & Henle.

PRIONACE Cantor, 1849 (glauca).

10. Prionace glaucum Linnaeus (Blue Shark).

GALEOCERDO Müller & Henle, 1837 (arcticus).

11. Galeocerdo arcticus Faber (Tiger Shark).

Family 7. MUSTELIDAE.

MUSTELUS Linck, 1790 (mustelus).

MUSTELUS Rafinesque, 1810 (galeus).

12. Mustelus australis Macleay (School Shark).
13. Mustelus antarcticus Günther (Gummy or Sweet William).

Family 8. SPHYRNIDAE

SPHYRNA Rafinesque, 1810 (zygaena).

14. Sphyrna zygaena Linnaeus (Hammer-headed Shark).

Family 8. ORECTOLOBIDAE.

ORECTOLOBUS Bonaparte, 1837 (barbatus).

15. Orectolobus maculatus Bonnaterre Common Carpet Shark).
16. Orectolobus devisi Ogilby (Banded Carpet Shark).
17. Orectolobus tentaculatus Peters (Sombre Carpet Shark).

PARASCYLLIUM Gill, 1861 (variolatum).

18. Parascyllium variolatum Duméril (Cat Shark).
19. Parascyllium ferrugineum McCulloch (Rusty Cat Shark).

Family 10. SCYLLIORHINIDAE.

HALAELURUS Gill, 1861 (burgeri).

HALAELURUS VINCENTI Zietz (Gulf Cat Shark).

20. Halaelurus analis Ogilby (Spotted Cat Shark).

Family 11. ALOPIIDAE.

ALOPIAS Rafinesque, 1810 (macrourus=vulpinus).

21. Alopias vulpinus Bonnaterre (Thresher).

Family 12. ODONTASPIDAE.

ODONTASPIS Agassiz, 1836 (taurus).

22. Odontaspis arenarius Ogilby (Grey Nurse).
23. Odontaspis tricuspidatus Day (Blue Nurse).

TRIAKIS Müller & Henle, 1838 (scyllium).

24. Triakis scyllium Müller & Henle.

Family 13. MITSUKURINIDAE

MITSUKURINA Jordan, 1898 (owstoni).

25. Mitsukurina owstoni Jordan (Elphin Shark).

Family 14. ISURIDAE.

ISURUS Rafinesque, 1810 (oxyrhynchus).

26. Isurus glaucus Müller & Henle (Blue Pointer).

CARCHARODON Müller & Henle, 1838 (rondeletii=carcharias).

27. Carcharodon Rondeleti Müller & Henle (White Pointer).

---

(1) Waite, Rec. S. Aust. Mus., ii, 1921, 1-208, pl. i, text fig. 1-332.
(2) Waite, Handbook to the Fishes of South Australia, p. 1-243.
(3) Waite, Rec. S. Aust. Mus., iii, 1927, 223-234, pl. xiii.

Family 15. CETORHINIDAE.
Cetorhinus Blainville, 1816 (gunneri=maximus).
28. Cetorhinus maximus Gunner (Basking Shark).
Family 16. SQUALIDAE.
SQUALUS Linnaeus, 1758 (acanthias).
29. Squalus fernandinus Molina (Spiny Dogfish).
DEANIA Jordan & Snyder, 1902 (eglantina).
30. Deania quadrispinosa McCulloch (Long-snouted Dogfish).
OXYNOTUS Rafinesque, 1910 (centrina).
31. Oxynotus bruniensis Ogilby (Rough Shark).
Family 17. SCYMNORHINIDAE.
SCHYMNORHINUS Bonaparte, 1846 (lichia =licha).
32. Schymnorhinus licha Bonnaterre.
Family 18. PRISTIOPHORIDAE
PRISTIOPHORUS Müller & Henle, 1837 (cirratus).
33. Pristiophorus cirratus Latham (Saw Shark).
34. Pristiophorus nudipinnis Günther Saw Shark).
Family 19. SQUATINIDAE.
SQUATINA Duméril, 1806 (squatina).
35. Squatina australis Regan (Angel Shark).
36. Squatina tergocellata McCulloch (Large-spotted Angel Shark).
Order BATOIDEI (Rays).
Family 20. RHINOBATIDAE.
APTYCHOTREMA Norman, 1926 (bougainvillii).
37. Aptychotrema banksii Müller & Henle Shovel-nosed Ray).
TRIGONORRHINA Müller & Henle, 1838 fasciata).
38. Trigonorrhina fasciata Müller & Henle (Fiddler).
Family 21. NARCOBATIDAE.
TORPEDO Forskål, 1775, in part (torpedo).
39. Torpedo fairchildi Hutton (Southern Numbfish).
HYPNARCE Waite, 1902 (subnigra).
40. Hypnarce subnigra Duméril (Numbfish).
Family 22. RAJIDAE.
RAJA Linnaeus, 1758 (batis).
41. Raja australis Macleay (skate).
PSAMMOBATIS Günther, 1870 (rudis).
42. Psammobatis waitii McCulloch (Round Ray).
Family 23. DASYATIDAE.
DASYATIS Rafinesque, 1810 (pastinacus).
43. Dasyatis brevicaudatus Hutton (Stingray).
UROLOPHUS Müller & Henle, 1837 (cruciatus).
44. Urolophus cruciatus Lacepède (Banded Stingaree).
45. Urolophus testaceus Müller & Henle (Stingaree).
46. Urolophus expansus McCulloch (Broad-backed Stingaree).
Family 24. MYLIOBATIDAE
MYLIOBATIS Cuvier, 1817 (aquila).
47. Myliobatis tenuicaudatus Hector (Eagle Ray).
Sub-Class HOLOCEPHALI.
Family 25. CALLORHYNCHIDAE.
Callorhynchus Cuvier, 1817 (callorhynchus).
48. Callorhynchus milii Bory (Elephant Shark).
Sub-Class TELEOSTOMI (Bony Fishes).
Order ISOSPONDYLI.
Family 26. ENGRAULIDAE.
ENGRAULIS Cuvier, 1817 (encrasicholus).
49. Engraulis australis Shaw (Anchovy).
Family 27. CLUPEIDAE.
ETRUMEUS Bleeker, 1853 (micropus).
50. Etrumeus jacksoniensis Macleay (Maray).
CLUPEA Linnaeus, 1758 (harengus).
51. Clupea bassensis McCulloch (Sprat).
SARDINIA Poey, 1860 (pseudohispanica).
52. Sardinia neopilcharda Steindachner (Pilchard).
NEMATALOSA Regan, 1916 (nasus)
NEMATALOSA RICHARDSONI Castelnau (Bony Bream).
STOLEPHORUS Lacepède, 1803 (japonicus).
53. Stolephorus robustus Ogilby (Blue Sprat).
HYPERLOPHUS Ogilby, 1893 (spratellides =vittatus).
54. Hyperlophus vittatus Castelnau (Rough-backed Sprat).
Family 28. ALEPOCEPHALIDAE.
XENODERMICHTHYS Günther, 1878.
55. Xenodermichthys squamilaterus Alcock.
Family 29. GONORHYNCHIDAE.
GONORHYNCHUS Scopoli, 1777 (gonorhynchus).
56. Gonorhynchus greyi Richardson (Sand Fish).
Family 30. GALAXIIDAE.
GALAXIAS Cuvier, 1817 (truttaceus).
57. Galaxias attenuatus Jenyns (Native trout, Pulangi).
Family 31. ARGENTINIDAE.
ARGENTINA Linnaeus, 1758 (sphyraena).
58. Argentina elongata Hutton (Silverside).
Family 32. RETROPINNIDAE.
RETROPINNA Gill, 1862 (retropinna).
59. Retropinna semoni Weber (Smelt, Kantari).
Family 33. STERNOPTYCHIDAE.
POLYIPNUS Günther, 1887 (spinosus).
60. Polyipnus tridentifer McCulloch (Luminous Fish).
Order INIOMI.
Family 34. AULOPIDAE.
AULOPUS Cuvier, 1817 (filamentosus).
61. Aulopus purpurissatus Richardson (Sergeant Baker).
Family 35. MYCTOPHIDAE.
MYCTOPHUM RAFINESQUE 1810 (punctatum).
62. Myctophum cephalotes Castelnau Lantern Fish).
NEOSCOPELUS Johnson, 1863 (macrolepidotus).

63. Neoscopelus macrolepidotus Johnson (Lantern Fish).

DIAPHUS Eigenmann & Eigenmann, 1891 (engraulis).

64. Diaphus coeruleus Klunzinger.

Family 37. HALOSAURIDAE.

POLYMETME McCulloch, 1926 (illustris).

65. Polymetme illustris McCulloch.

ARGYRIPNUS Gilbert & Cramer, 1897 (ephippiatus).

66. Argyripnus iridescens McCulloch.

Order LYOPOMI.

Family 38. HALOSAURIDAE.

HALOSAURUS Johnson, 1863 (oweni).

67. Halosaurus pectoralis McCulloch.

Order NEMATOGNATHI.

38. Family PLOTOSIDAE.

CNIDOGLANIS Günther, 1864 (megastoma).

68. Cnidoglanis megastoma Richardson (Estuary Catfish).

NEOPLOTOSUS Castelnau, 1875 (waterhousii).

69. Neoplotosus waterhousii Castelnau (S. Australian Catfish).

Order SYMBRANCHII.

Family 39. ALABIDÆ.

ALABES (Cuvier) akin Richardson, 1817, (dorsalis).

70. Alabes rufus Macleay (Shore Eel).

Order APODES.

Family 40. ANGUILLIDAE.

ANGUILLA Shaw, 1803 (anguilla).

71. Anguilla australis Richardson (Short-finned Eel).

72. Anguilla reinhardtii Steindachner (Long-finnedEel).

Family 41. CONGRIDAE.

CONGER Cuvier, 1817 (conger).

73. ?Conger Wilsoni Bloch & Schneider (Conger Eel).

Family 42. ECHELIDAE.

MURAENICHTHYS Bleeker, 1853 (gymnopterus).

74. Muraenichthys breviceps Günther (Slender Eel).

Order THORACOSTEI.

Family 43. MACRORHAMPHOSIDAE.

CENTRISCOPS Gill, 1862 (humerosus).

75. Centriscops humerosus Richardson (Bellows Fish).

Family 44. SYNGNATHIDAE.

SYNGNATHUS Linnaeus, 1758 (acus).

76. Syngnathus poecilolaemus Peters (Long-snouted Pipefish).

77. Syngnathus phillipi Lucas (Medium-snouted Pipefish).

78. Syngnathus vercoi Waite & Hale (Little Pipefish).

79. Syngnathus curtirostris Castelnau. (Short-snouted Pipefish).

LEPTONOTUS Kaup, 1853 (blainvillianus).

80. Leptonotus costatus Waite & Hale (Deep-bodied Pipefish).

HISTIOGAMPHELUS McCulloch, 1914 (briggsii).

31. Histiogamphelus rostratus Waite & Hale (Knife-snouted Pipefish).

ICHTHYOCAMPUS Kaup, 1853 (belcheri).

82. Ichthyocampus cristatus McCulloch & Waite (Crested Pipefish).

LISSOCAMPUS Waite & Hale, 1921 (caudalis)

83. Lissocampus caudalis Waite & Hale (Smooth Pipefish).

LEPTOICHTHYS Kaup, 1853 (fistularius).

84. Leptoichthys fistularius Kaup (Brush-tailed Pipefish).

STIGMATOPORA Kaup, 1853 (argus).

85. Stigmatopora argus Richardson (Spotted Pipefish).

86. Stigmatopora nigra Kaup (Wide-bodied Pipefish).

SOLEGNATHUS Swainson, 1839 (hardwickii).

87. Solegnathus robustus McCulloch (Pipehorse).

PHYLLOPTERYX Swainson, 1839 (foliatus).

88. Phyllopteryx foliatus Shaw (Common Sea Dragon).

PHYCODURUS Gill, 1896 (eques).

PHYCODURUS EQUES Günther (Leafy Sea Dragon).

ACENTRONURA Kaup, 1853 (gracilissima).

89. Acentronura australe Waite & Hale Little Pipe-Horse).

HIPPOCAMPUS Rafinesque, 1810 (hippocampus).

90. Hippocampus abdominalis Lesson (Sea-horse).

91. Hippocampus novae-hollandiae Steindachner (Common Sea-horse).

92. Hippocampus breviceps Peters (Short-headed Sea-horse).

Order HYPOSTOMIDES.

Family 45. PEGASIDAE.

ACANTHOPEGASUS McCulloch, 1915 (lancifer).

93. Acanthopegasus lancifer Kaup.

Order SYNENTOGNATHI.

Family 46. SCOMBRESOCIDAE.

SCOMBRESOX Lacepède, 1803 (camperii).

94. Scombresox fosteri Cuvier & Valenciennes (Billfish, Skipper).

Family 47. EXOCOETIDAE.

CYPSELURUS Swainson, 1839 (nuttallii).

95. Cypselurus cribrosus Kner (Flying Fish).

Family 48. HEMIRHAMPHIDAE.

HYPORHAMPHUS Gill, 1859 (tricuspidatus).

96. Hyporhamphus intermedius Cantor (Garfish).

Order ANACANTHINI.

Family 49. MACROURIDAE.

NEMATONURUS Günther, 1887 (armatus).

97. Nematonurus armatus Hector.

LEPIDORHYNCHUS Bleeker, 1879 (villosus).

98. Lepidorhynchus denticulatus Richardson.

COELORHYNCHUS Giorna, 1805 (laville).

99. Coelorhynchus fasciatus Günther.

MALACOCEPHALUS Günther, 1862 (laevis).

100. MALACOCEPHALUS LAEVIS Lowe.

LIONURUS Günther, 1887 (filicauda).
101. LIONURUS NIGROMACULATUS McCulloch.

Family 50. GADIDAE.

LOTELLA Kaup, 1858 (phycis).
102. Lotella callarias Günther (Beardie).
PHYSICULUS Kaup, 1858 (dalwigkii).
103. Physiculus barbatus Günther (Cod).
104. Physiculus bachus Forster (Red Cod).
EUCLICHTHYS McCulloch, 1926 (polynemus).
105. Euclichthys polynemus McCulloch.

Order BERYCOMORPHI.

Family 51. BERYCIDAE.

TRACHICHTHODES Gilchrist, 1903 (spinosus).
106. Trachichthodes lineatus Cuvier & Valenciennes (Swallow-tail).
107. Trachichthodes affinis Günther (Nannygai).
108. Trachichthodes gerrardi Günther (Red Snapper).

Family 52. TRACHICHTHYIDAE.

HOPLOSTETHUS Cuvier & Valenciennes, 1829 (mediterraneus).
109. Hoplostethus mediterraneus Cuvier & Valenciennes.
110. Hoplostethus intermedius Hector.
111. Hoplostethus gigas McCulloch.
GEPHYROBERYX Boulenger, 1902 (darwinii).
112. Gephyroberyx darwinii Johnson.
PARATRACHICHTHYS Waite, 1899 (trailli).
113. Paratrachichthys trailli Hutton.
TRACHICHTHYS Shaw & Nodder, 1799 (australis).
114. Trachichthys australis Shaw & Nodder (Roughy).

Family 53. ZEIDAE.

ZEUS Linnaeus, 1758 (faber).
115. Zeus faber Linnaeus (John Dory).

Family 54. CYTTIDAE.

CYTTUS Günther, 1860 (australis).
116. Cyttus australis Richardson (Silver Dory).
CYTTOSOMA Gilchrist, 1904 (boops).
117. Cyttosoma boops Gilchrist (Ox-eyed Dory).
NEOCYTTUS Gilchrist, 1907 (rhomboidalis).
118. Neocyttus rhomboidalis Gilchrist. var. Gibbosus McCulloch.
ALLOCYTTUS McCulloch, 1914 (verrucosus).
119. Allocyttus verrucosus Gilchrist. var. Propinquus McCulloch.

Order PERCOMORPHI.
Sub-Order PERCESOCES.

Family 55. ATHERINIDAE.

ATHERINA Linnaeus, 1758 (hepsetus).
120. Atherina tamarensis Johnson.
121. Atherina microstoma Günther.
122. Atherina Dannevigi McCulloch.
HEPSETIA Bonaparte, 1837 (boyeri).
123. Hepsetia pinguis Lacepède (Hardyhead).

Family 56. MELANOTAENIIDAE.

MELANOTAENIA Gill, 1862 (nigrans).
124. Melanotaenia nigrans Richardson (Pink ear).

Family 57. MUGILIDAE.

MUGIL Linnaeus, 1858 (cephalus).
125. Mugil argenteus Quoy & Gaimard (Jumping Mullett, Wankari).
126. Mugil cephalus Linnaeus (Sea Mullet).
AGONOSTOMUS Bennett, 1830 (telfari).
127. Agonostomus fosteri Bloch & Schneider (Fresh-water Mullet, Conmuri).
MYXUS Günther, 1861 (elongatus).
128. MYXUS elongatus Günther (Sand Mullet).

Family 58. SPHYRAENIDAE.

SPHYRAENA Walbaum, 1793 (sphyraena).
129. Sphyraena novae-hollandiae Günther Snook, Short-finned Pike).
130. Sphyraena obtusata Cuvier & Valenciennes (Pike).

Sub-Order STROMATEOIDEA.

Family 59. STROMATEIDAE.

SERIOLELLA Guichenot, 1848 (porosa).
131. Seriolella brama Günther (Sea Bream)
HYPEROGLYPHE Günther, 1959 (porosa)
132. Hyperoglyphe porosa Richardson (Deep-sea Trevally).

Sub-Order PERCOIDEA.
Division PERCIFORMES.

Family 60. SERRANIDAE.

COLPOGNATHUS Klunzinger, 1880 dentex).
133. Colopognathus dentex Cuvier & Valenciennes (Harlequin Fish).
CALLANTHIAS Lowe, 1839 (paradisaeus).
134. Callanthias allporti Günther (Allport's Perch).
CAESIOPERCA Castlenau, 1872 (rasor).
135. Caesioperca rasor Richardson (Red Perch).
136. Caesioperca lepidoptera Forster (Butterfly Perch).
HYPOPLECTRODES Gill, 1862 (nigroruber).
137. Hypoplectrodes nigroruber Cuvier & Valenciennes (Black-banded Sea Perch).
HELOTES Cuvier, 1829 (sexlineatus).
138. Helotes sexlineatus Quoy & Gaimard (Striped Perch).

Family 61. PLESIOPIDAE.

PARAPLESIOPS Bleeker, 1875 (bleekeri).
139. Paraplesiops meleagris Peters (Blue Devil).
140. Paraplesiops gigas Steindachner.

Family 62. APOGONIDAE.

APOGON Lacepède, 1802 (ruber).
141. Apogon conspersus Klunzinger (Soldier Fish).
APOGONOPS Ogilby, 1896 (anomalus).
142. Apogonops anomalus Ogilby.
DINOLEHTS Klunzinger, 1872 (mulleri =lewini).
143. Dinolestes lewini Griffith (Long-finned Pike).

Family 63. SILLAGINIDAE.

SILLAGINODES Gill, 1861 (punctatus).

144. Sillaginodes punctatus Cuvier & Valenciennes (Spotted Whiting).

SILLAGO Cuvier, 1817 (acuta).

145. Sillago bassensis Cuvier & Valenciennes (Bass Whiting).

Family 64. CARANGIDAE.

SCOMBEROIDES Lacepède, 1802 (commersonianus).

146. Scomberoides toloo Cuvier & Valenciennes (Leather-skin).

SERIOLA Cuvier, 1817 (dumerilli).

147. Seriola grandis Castelnau (Yellowtail).

TRACHURUS Rafinesque, 1810 (trachurus).

148. Trachurus novae-zelandiae Richardson (Horse Mackerel).

149. Trachurus declivis Jenyns (Scad).

CARANX Lacepède, 1802 (carangus).

150. Caranx georgianus Cuvier & Valenciennes (Trevally).

Family 65. POMATOMIDAE.

POMATOMUS Lacepède, 1803.

151. Pomatomus saltatrix Linnaeus (Skipjack).

Family 66. ARRIPIDIDAE.

ARRIPIS Jenyns, 1842 (georgianus).

152. Arripis trutta Forster (Australian Salmon).

153.Arripis georgianus Cuvier & Valenciennes (Tommy Rough, Wankaldi).

Family 67. EMMELICHTHYIDAE.

PLAGIOGENEION Forbes, 1890 (rubiginosus).

154. Plagiogeneion macrolepis McCulloch (Ruby Fish).

Family 68. GERRIDAE.

PAREQUULA Steindachner, 1879 (bicornis).

155. Parequula melbournensis Castelnau.

Family 69. SCIAENIDAE.

SCIAENA Linnaeus, 1758 (umbra).

156. Sciaena antarctica Castelnau (Butterfish, Mulloway).

Family 70. MULLIDAE.

UPENEUS Cuvier, 1829 (bifasciatus).

157. Upeneus porosus Cuvier & Valenciennes (Red Mullet).

Family 71. SPARIDAE.

PAGROSOMUS Gill, 1893 (auratus).

158. Pagrosomus auratus Foster (Snapper).

SPARUS Linnaeus, 1758 (aurata).

159. Sparus australis Günther (Black Bream).

Family 72. PEMPHERIDAE.

LIOPEMPHERIS Ogilby, 1913 (multiradiata).

160. Liopempheris multiradiata Klunzinger (Bull's-eye).

PEMPHERIS Cuvier, 1829 (argenteus).

161. Pempheris klunzingeri McCulloch.

PARAPRIACANTHUS Steindachner, 1870 (ransonneti).

162. Parapriacanthus elongatus McCulloch.

Family 73. SCORPIDIDAE.

SCORPIS Cuvier & Valenciennes, 1831 (georgianus).

163. Scorpis georgianus Cuvier & Valenciennes (Banded Sweep).

Family 74. KYPHOSIDAE.

KYPHOSUS Lacepéde, 1802, (bigibbus).

164. Kyphosus sydneyanus Günther (Drummer).

Family 75. GIRELLIDAE.

GIRELLA Gray, 1833 (punctata).

165 .Girella tricuspidata Quoy & Gaimard (Blackfish).

MELAMBAPHES Günther, 1863 (nigroris).

166. Melambaphes zebra Richardson (Zebra fish).

Family 76. CHAETODONTIDAE.

VINCULUM McCulloch, 1914 (sexfasciatum).

167. Vinculum sexfasciatum Richardson (Six-banded Coral-fish).

CHELMONOPS Bleeker, 1876 (truncatus).

168. Chelmonops truncatus Kner.

Family 77. ENOPLOSIDAE.

ENOPLOSUS Lacepéde, 1802 (armatus).

169. Enoplosus armatus Shaw (Old Wife).

Family 78. HISTIOPTERIDAE.

PENTACEROPSIS Steindachner, 1833 recurvirostris).

170. Pentaceropsis recurvirostris Richardson (Striped Boar-fish).

ZANCLISTIUS Jordan, 1907 (elevatus).

171. Zanclistius elevatus Ramsay & Ogilby (Short Boar-fish).

PENTACEROS Cuvier, 1829 (capensis).

172. Pentaceros hendecacanthus McCulloch.

PARISTIOPTERUS Bleeker, 1876 (labiosus).

173. Paristiopterus labiosus Günther (Boarfish).

Family 79. OPLEGNATHIDAE.

OPLEGNATHUS Richardson, 1840 (conwaii).

174. Oplegnathus woodwardi Waite (Knife-jaw).

Family 80. CEPOLIDAE.

CEPOLA Linnaeus, 1764 (rubescens).

175. Cepola australis Ogilby (Band Fish).

Division CIRRHITIFORMES.

Family 81. CHEILODACTYLIDAE.

GONIISTIUS Gill, 1862 (zonatus).

176. Goniistius vizonarius Kent (Magpie Perch).

Family 82. APLODACTYLIDAE.

DACTYLOSARGUS Gill, 1862 (arctidens).

177. Dactylosargus arctidens Richardson.

DACTYLOPAGRUS Gill, 1862 (carponemus).

178. Dactylopagrus carponemus Cuvier & Valenciennes (Sea-carp).

179. Dactylopagrus macropterus Forster (Jackass Fish).

DACTYLOPHORA De Vis, 1883 (semimaculata=nigricans).

180. Dactylophora nigricans Richardson (Strong Fish, Tillywurti).

THREPTERIUS Richardson, 1850 (maculosus).

181. Threpterius maculosus Richardson.

Family 83. LATRIDIDAE.

LATRIDOPOSIS Gill, 1862 (ciliaris).

182. Latridopsis fosteri Castlenau (Silver Thumpeter).

Division POMACENTRIFORMES.

Family 84. POMACENTRIDAE.

PARMA Günther, 1862 (microlepis).

183. Parma microlepis (Günther (Puller).

ABUDEFDUF Forskål, 1875 (sordidus).

184. Abudefduf victoriae Günther (Scaly-fin).

Division LABRIFORMES.

Family 85. LABRIDAE.

PSEUDOLABRUS Bleeker, 1862 (rubiginosus).

185. Pseudolabrus psittaculus Richardson.

186. Pseudolabrus fucicola Richardson.

187. Pseudolabrus celidotus Forster.

188. Pseudolabrus aurantiacus Castelnau.

189. Pseudolabrus tetricus Richardson.

190. Pseudolabrus punctulatus Günther.

191. Pseudolabrus Macleayi Herzenstein.

PICTILABRUS Gill, 1891 (laticlavius).

192. Pictilabrus laticlavius Richardson (Senator Fish).

AUSTROLABRUS Steindachner, 1884 (maculatus).

183. Austrolabrus maculatus Macleay.

THALLIURUS Swainson, 1839 (blochi).

194. Thalliurus bleasdalei Castelnau.

OPHTHALMOLEPIS Bleeker, 1861 (lineolatus).

195. Ophthalmolepis lineolatus Cuvier & Valenciennes (Maori).

ACHŒRODUS Gill, 1863 (gouldii).

196. Achœrodus gouldii Richardson (Groper).

Family 86. ODACIDAE.

ODAX Cuvier, 1829 (pullus).

197. Odax radiatus Quoy & Gaimard.

198. Odax semifasciatus Cuvier & Valenciennes (Rock Whiting).

199. Odax frenatus Günther.

200. Odax pusillus Castelnau.

201. Odax waterhousii Castelnau.

OLISTHOPS Richardson, 1850 (cyanomelas)

202. Olisthops cyanomelas Richardson (Herring Cale).

SIPHONOGNATHUS Richardson, 1857 (argyrophanes).

203. Siphonognathus argyrophanes Richardson (Tube-mouth).

Family 87. SCARIDAE.

SCARUS Forskål, 1775 (psittacus).

204. Scarus modestus Castelnau (G).

205. Scarus dumerilii Castelnau.

HETEROSCARUS Castelnau, 1872 (filamentosus).

206. Heteroscarus filamentosus Castelnau (Rainbow-fish.

Division TRACHINIFORMES.

Family 88. PARAPERCIDÆ.

207. Parapercis ramsayi Steindachner (G).

208. Parapercis haackei Steindachner (G).

209. Parapercis allporti Günther (G).

Family 89. URANOSCOPIDAE.

KATHETOSTOMA Günther, 1860 (laeve).

210. Kathetostoma laeve Bloch & Schneider (Stone-lifter).

211. Kathetostoma nigrafosciatum Waite & McCulloch (Banded Stone-lifter).

Division NOTOTHENIIFORMES.

Family 90. BOVICHTHYIDAE.

BOVICHTHYS Cuvier & Valenciennes, 1831 (diacanthus).

(Originally written **Bovichtus**).

212. Bovichthys variegatus Richardson.

Division CALLIONYMIFORMES.

Family 91. CALLIONYMIDAE.

CALLIONYMUS Linnaeus, 1758 (lyra).

213. Callionymus calauropomus Richardson (Stink-fish).

214. Callionymus apricus McCulloch.

Suborder SCOMBROIDEA.

Family 92. SCOMBRIDAE.

THUNNUS South, 1845 (thynnus).

215. Thunnus maccori Castelnau (Tunny).

PNEUMATOPHORUS Jordan & Gilbert, 1883 (coliar).

216. Pneumatophorus australasicus Cuvier & Valenciennes (Mackerel).

Sub-Order TRICHIUROIDEA.

Family 93. TRICHIURIDAE.

THYRSITES Cuvier, 1829 (atun).

217. Thyrsites atun Euphrasen (Barracouta).

Sub-Order XIPHIOIDEA.

Family 94. XIPHIIRAE.

XIPHIAS Linnaeus, 1758 (gladius).

218. Xiphias gladius Linnaeus (Swordfish).

Sub-Order GOBIOIDEA.

Family 95. GOBIIDAE.

GOBIUS Linnaeus, 1758 (niger).

219. Gobius bifrenatus Kner (Bridled Goby, Tarkatuki).

220. Gobius hinsbyi McCulloch & Ogilby.

221. Gobius lateralis Macleay.

222. Gobius haackei Steindachner.

223. Gobius filamentosus Castelnau.

CALLOGOBIUS Bleeker, 1874 (hasselti)

224. Callogobius hasselti Bleeker, subdi. Mucosus Günther.

MUGILOGOBIUS Smitt, 1899 (abau).

225. Mugilogobius galwayi McCulloch & Waite (Blue-spot Goby).

Family 96. ELEOTRIDAE.

PHILYPNODON Bleeker, 1874 (nudiceps= grandiceps?).

226. Philypnodon grandiceps Krefft (Big-headed Gudgeon).

Sub-Order BLENNIOIDEA.

Family 97. BLENNIIDAE.

BLENNIUS Linnaeus, 1758 (ocellaris).

227. Blennius tasmanianus Richardson (Blenny).

Family 97a. CLINIDAE.

PERONEDYS Steindachner, 1884 (anguillaris).

228. Peronedys anguillaris Steindachner.

HETEROCLINUS Castelnau, 1872 (adelaidae).

229. Heteroclinus adelaidae Castelnau.

OPHICLINUS Castelnau, 1872 (antarcticus).

230. Ophiclinus antarcticus Castelnau.

231. Ophiclinus gracilis Waite.

232. Ophiclinus pardalis McCulloch & Waite.
233. Ophiclinus homacanthus Herzenstein.
234. Ophiclinus aethiops McCulloch & Waite.
235. Ophiclinus varius McCulloch Waite.
236. Ophiclinus microchirus Herzenstein.

CRISTICEPS Cuvier & Valenciennes, 1836 (australis).

237. Cristiceps australis Cuvier & Valenciennes (Weed Fish).
238. Cristiceps tristis Klunzinger.

CLINUS Cuvier, 1817 (superciliosus).

239. Clinus perspicillatus Cuvier & Valenciennes.

LEPIDOBLENNIUS Steindachner, 1867 (haplodactylus).

240. Lepidoblennius marmoratus Macleay.

HELCOGRAMMA McCulloch & Waite. 1918 (decurrens).

241. Helcogramma decurrens McCulloch & Waite.
242. Trianectes bucepalus McCulloch & Waite.

Sub-Order OPHIDIOIDEA.

Family 98. BROTULIDAE.

DERMATOPSIS Ogilby, 1896 (macrodom).

243. Dermatopsis multiradiatus McCulloch & Waite.

Family 99. OPHIDIIDAE.

GENYPTERUS Phillipi, 1857 (nigricans).

244. Genypterus blacodes Bloch & Schneider (Rockling).
245. Genypterus microstomus Regan.

Order HETEROSOMATA.

Family 100. BOTHIDAE.

LOPHONECTES Günther, 1880 (gallus).

246. Lophonectes gallus Günther (Crested Flounder).

ARNOGLOSSUS Bleeker, 1862 (arnoglossus).

247. Arnoglossus muelleri Klunzinger.
248. Arnoglossus bassensis Norman.

Family 101. PLEURONECTIDAE

RHOMBOSOLEA Günther, 1862 (monopus=plebia).

249. Rhombosolea tapirina Hutton (Melbourne Flounder).

AMMOTRETIS Günther, 1862 (rostratus).

250. Ammotretis rostratus Günther (Long-snouted Flounder).
251. Ammotretis elongatus McCulloch.
252. Ammotretis tudori McCulloch.
253. Ammotretis brevipinnis Norman.

AZYGOPUS Norman, 1926 (pinnifasciatus).

254. Azygopus pinnifasciatus Norman.

Family 102. SOLEIDAE.

ASERAGGODES Kaup, 1858 (guttulatus).

255. Aseraggodes haackeana Steindachner (Sole).

Family CYNOGLOSSIDAE.

CYNOGLOSSUS Hamilton-Buchanan, 1822 (ligua).

256. Cynoglossus broadhursti Waite.

Order DISCOCEPHALI.

Family 103. ECHENEIDIDAE.

ECHENEIS Linnaeus, 1758 (naucrates).

257. Echeneis autralis Bennett (Sucker Fish).
258. Echeneis remora Linneaus (Remora).

Order SCLEROPAREI.

Family 104. SCORPÆNDIAE.

SCORPÆNA Linnaeus, 1758 (porcus).

259. Scorpaena cruenta Richardson (Red Rock-cod).

HELICOLENUS Goode & Bean, 1895 dactyolpterus).

260. Helicolenus percoides Richardson (Red Gurnard-peach).

NEOSEBASTES Guichenot, 1867 (scorpaenoides).

261. Neosebastes scorpænoides Guichenot (Gurnard-perch)
262. Neosebastes pandus Richardson (Gurnard-perch).
263. Neosebastes nigropunctatus McCulloch (Black-spotted Gurnard perch).
264. Neosebastes thetidis Waite (Thetis Fish).
265. Neosebastes pantica McCulloch & Waite.

GYMNAPTISTES Swainson, 1839 (marmoratus).

266. Gymnapistes marmoratus Cuvier & Valenciennes (Cobbler).

GLYPTAUCHEN Günther, 1860 (panduratus).

267. Glyptauchen pandaratus Richardson (Saddle-head).

Family 105. APLOACTIDAE.

APLOACTIS Schlegel, 1843 (aspera).

268. Aploactis milesii Richardson (Velvet-fish).

Family 106. PATAECIDAE.

PATÆCUS Richardson, 1844 (fronto).

269. Patæcus fronto Richardson (Forehead Fish).
270. Patæcus maculatus Günther (Warty-fish).
271. Patæcus vincentii Steindachner.

NEOPATÆCUS Steindachner, 1883 (maculatus=waterhousii).

272. Neopatæcus waterhousii Castelnau.

Family 107. CONGIOPADIDAE.

CONGIOPOPUS Perry, 1811 (percatus).

273. Congiopopus leucopæcilus Richardson. (Pigfish).
274. Congiopopus leucometopon Waite.

Family 108. GNATHANACANTHIDAE.

GNATHANACANTHUS Bleeker, 1855 (goetzeei).

275. Gnathanacanthus goetzeei Bleeker (Velvet-fish).

Family 109. PLATYCEPHALIDAE.

PLATYCEPHALUS Bloch, 1795 (spathula).

276. Platycephalus fuscus Cuvier & Valenciennes (Dusky Flathead).
277. Platycephalus bassensis Cuvier & Valciennes (Sand Flathead).
278. Platycephalus lævigatus Cuvier & Valenciennes.
279. Platycephalus inops Jenyns.

280. Platycephalus haackei Steindachner.
281. Platycephalus semermis De Vis.
NEOPLATYCEPHALUS Castelnau, 1872 (grandis).
282. Neoplatycephalus grandis Castelnau.
283. Neoplatycephalus conatus Waite & McCulloch (Deep-water Flathead).
THYSANOPHRYS Ogilby, 1898 (cirronasus).
284. Thysanophrys cirronasus Richardson (Tassel-snouted Flathead).

Family 110. HOPLICHTHYIDAE.

HOPLICHTHYS Cuvier & Valenciennes, 1829 (langsdorfii).
285. Hoplichthys haswelli McCulloch.

Family 111. TRIGLIDAE.

PARATRIGLA Ogilby, 1911 (pleuracanthica).
286. Paratrigla vanessa Richardson.
287. Paratrigla papilio Cuvier & Valenciennes.
PTERYGOTRIGLA Waite, 1899 (polyommata).
288. Pterygotrigla polyommata Richardson (Flying Gurnard).
CHELIDONICHTHYS Kaup, 1873 (hirundo).
289. Chelidonichthys kumu Lesson & Garnot (Red Gurnard).

Order XENOPTERI.

Family 112. GOBIESOCIDAE.

ASPASAMOGASTER Waite, 1907 (spatula).
290. Aspasmogaster tasmaniensis Güntherf (Cling-fish).
291. Aspasmogaster spatula Günther (Cling-fish).
DIPLOCREPIS Günther, 1861 (puniceus).
292. Diplocrepis costatus Ogilby (Cling-fish).
293. Diplocrepis parvipinnis Waite (Small-finned Cling-fish).

Order PEDICULATI.
Sub-Order LOPHIOIDEA.

Family 113. ANTENNARIIDAE.

RHYCHERUS Ogilby, 1907 (wildii=filamentosus).
294. Rhycherus filamentosus Castelnau (Tasselled Frog-fish).
HISTIOPHRYNE Gill, 1863 (bougainvilli).
295. Histiophryne bougainvilli Cuvier & Valenciennes (Smooth Frog-fish).
296. Histiophryne scortea McCulloch & Waite (White-spotted Frog-fish).
ECHINOPHRYNE McCulloch & Waite, 1918 (crassispina).
297. ECHINOPHRYNE crassispina McCulloch & Waite (Prickly Frog-fish).
TRICHOPHRYNE McCulloch & Waite, 1918 (mitchellii).
298. Trichophryne mitchellii Morton (Bristly Frog-fish).

Family 114. BRACHIONICHTHYIDAE.

SYMPTERICHTHYS Gill, 1878 (laevis).
299. Sympterichthys verrucosus McCulloch & Waite (Warty Frog-fish).

Order PLECTOGNATHI.
Division SCLERODERMI.

Family 115. MONACANTHIDAE.

CANTHERINES Swainson, 1839 (nasutus).
300. Cantherines granulatus Shaw (Rough Leather-jacket).
301. Cantherines hippocrepis Quoy & Gaimard (Horseshoe Leather-jacket).
302. Cantherines brownii Richardson (Toothbrush Leather-jacket).
303. Cantherines ayruadi Quoy & Gaimard (Yellow Leather-jacket).
304. Cantherines vittiger Castelnau.
305 Cantherines Güntheri Macleay.
306. Cantherines peronii Hollard (Banded Leather-jacket).
307. Cantherines multiradiatus Günther.
308. Cantherines spilomelanurus Quoy & Gaimard (Bridled Leather-jacket).
309. Cantherines setosus Waite (Velvet Leather-jacket).
310. Cantherines mosaicus Ramsay & Ogilby (Mosaic Leather-jacket).
BRACHALUTERES Bleeker, 1866 (trossulus).
311. Brachaluteres trossulus Richardson (Little Leather-jacket).

Family 116. OSTRACIIDAE.

OSTRACION Linnaeus, 1758 (cubicus=tuberculatum).
312. Ostracion tuberculatum Linnaeus (Box-fish).
CAPROPYGIA Kaup, 1855 (unistriata).
313. Capropygia unistriata Kaup.
ANOPLOCAPROS Kaup, 1855 (grayi=lenticularis).
314. Anoplocapros lenticularis Richardson.
315. Anoplocapros gibbosus McCulloch & Waite.
ARACANA Gray, 1838 (ornata).
316. Aracana ornata Gray (Common Cow-fish).
317. Aracana aurita Shaw.
318. Aracana spilogastra Richardson.
319. Aracana angusta McCulloch & Waite.
320. Aracana Flavigastra Gray.

Division GYMNODONTES.

Family 117. TETRAODONTIDAE.

SPHŒROIDES Lacepède, 1798 (tuberculatus).
321. Sphœroides tetragonus Forster.
322. Sphœroides pleurogramma Regan.
323. Sphœroides liosomus Regan.
TETRAODON Linnaeus, 1758 (lineatus).
324. Tetraodon armilla Waite & McCulloch (Ringed Toado).

Family 118. DIODONTIDAE.

DIODON Linnaeus, 1758 (hystrix).
325. Diodon holocanthus Linnaeus (Porcupine fish).
ALLOMYCTERUS McCulloch, 1921 (jaculiferus).
326. Allomycterus jaculiferus Cuvier.
ATOPOMYCTERUS Bleeker, 1865 (nychthemerus).
327. Atopomycterus nichthemerus Cuvier (Porcupine Fish).

Family 119. MOLIDAE.

MOLA Koelreuter, 1766 (aculeata=mola).
328. Molo mola Linnaeus (Sunfish).

A Check-List of the Fishes of the Santa Cruz Archipelago, Melanesia

By GILBERT P. WHITLEY,
Australian Museum, Sydney, New South Wales*

THOUGH the Santa Cruz Archipelago was discovered by Medaña so long ago as 1595, the islands have not been extensively settled upon because of adverse climatic conditions and, in bygone years especially, because of the hostility of the natives. The gallant French navigator La Perouse was shipwrecked at Vanikoro in 1788 and his fate remained a mystery for forty years. The first collections representative of the natural history of the group were made by Quoy and Gaimard, who accompanied Contre-Amiral Dumont d'Urville in the "Astrolabe" and spent twenty-six days at Vanikoro in 1828. Most of the fishes they obtained were later described by Cuvier and Valenciennes in Paris. For almost a century no collectors appear to have obtained fishes in the Santa Cruz Group, though several missionaries and naturalists gathered insects, shells, and ethnographical specimens there.

In 1926, Messrs. E. Le G. Troughton and A. A. Livingstone of the Australian Museum, Sydney, spent five weeks in the Santa Cruz Islands and collected 126 specimens of fishes besides other natural history objects, which are now in the Australian Museum. From their collection and from the literature listed below, I have been able to compile a list of the few fishes known from the Santa Cruz Archipelago. Descriptions and figures of the new and interesting species are being prepared by me for a forthcoming part of the "Records of the Australian Museum."

In some cases, fishes have been recorded from the Santa Cruz Islands under names different from those used for them today. To facilitate the recognition of these synonyms, they and some others are listed below preceded by the contraction "Syn."

(By permission of the Trustees of the Australian Museum).

BIBLIOGRAPHY

1828-1847. Cuvier & Valenciennes, Histoire Naturelle des Poissons, i-xx.
1832. Valenciennes, Nouv. Ann. Mus. d'Hist. Nat. i, pp. 58-60.
1834. Griffith, Animal Kingdom, x. English edition of Cuvier's Règne Animal.
1835. Quoy and Gaimard, Voy. Astrolabe, Zool., iii, Fishes, pp. 656-705, pls. iii-xx.
1841. Müller & Henle, Syst. beschr. Plagiostomen, part 3, p. 164.
1859-1870. Günther, Cat. Fish. Brit. Mus. i-viii.
1873-1910. Günther, Fische der Südsee, in Journ. Mus. Godeffroy.
1880. Sauvage, Bull. Soc. Philomatique (7) iv, p. 54 (*fide* Zoological Record). Not seen by me.
1906. Jordan & Seale, Bull. U. S. Bur. Fisheries xxv (1905), pp. 173-455.
1926. Troughton & Livingstone, Austr. Mus. Mag. iii.

Family i. DASYATIDAE.

1. Dasyatis kuhlii (Müller & Henle).

Family ii. CLUPEIDAE.

3. Harengula vittata (C. & V.).
4. Harengula punctata (Rüppell). Syn. H. vanicoris Jordan & Seale.

Family iii. SYNODONTIDAE.

5. Saurida tumbil (Bloch).

Family iv. ANGUILLIDAE.

6. Anguilla mauritiana Bennett.[1]

Family v. MURAENIDAE.

7. Gymnothorax pictus (Thunberg).
8. Echidna nebulosa (Thunberg).

Family vi. OPHICHTHYIDAE.

9. Leiuranus semicinctus (Lay & Bennett).

Family vii. BELONIDAE.

10. Tylosurus urvillii (C. & V.).

Family viii. HEMIRAMPHIDAE.

11. Hemiramphus far (Forskål). Syn. H. commersonii Cuvier.

Family ix. EXOCOETIDAE.

12. Cypsilurus unicolor. (C. & V.).
13. Cypsilurus spilonotopterus (Bleeker).

Family x. HONOCENTRIDAE.

14. Holocentrus (Sargocentron) leo (C. &

[1] Kindly identified by Dr. Johannes Schmidt, Copenhagen.

V.).
15. Holocentrus (Holocentrus) laticeps (C. & V.).

Family xi. ATHERINIDAE.

16. Atherina lacunosa Bloch & Schneider.

Family xii. MUGILIDAE.

17. Mugil perusii C. & V.
18. Mugil crenilabis Forskål. Syn. M. cirrhostomus Bloch & Schneider.
19. Liza melinoptera (C. & V.).
20. Liza vaigiensis (Quoy & Gaimard). Syn. Mugil macrolepidotus Rüppell.

Family xiii. THUNNIDAE.

21. Neothunnus macropterus (Temminck & Schlegel).[2]

Family xiv. RACHYCENTRIDAE.

22. Rachycentron pondicerianum (C. & V.).

Family xv. CARANGIDAE.

23. Selar boops (C. & V.).
24. Selar torvus (Jenyns).
25. Caranx forsteri C. & V.
26. Caranx sexfasciatus Quoy & Gaimard.
27. Caranx peronii C. & V.
28. Caranx melampygus C. & V.
29. Caranx oblongus C. & V.
30. Caranx speciosus (Forskål).
31. Scomberoides toloo (C. & V.). Syn. Chorinemus mauritianus C. &. V.

Family xvi. GERRIDAE.

32. Gerres punctatus C. & V. Syn. G. filamentosus C. & V.
33. Gerres argyreus (Bloch & Schneider).

Family xvii. LEIOGNATHIDAE.

34. Gazza minuta (Bloch). Syn. Equula dentex C. & V.

Family xviii. KUHLIIDAE.

35. Kuhlia marginata (C. & V.).
36. Kuhlia rupestris (Lacépède). Syn. Dules vanicolensis C. & V. and Dules haswellii Macleay.

Family xix. APOGONIDAE.

37. Apogon lateralis Valenciennes.
38. Apogon novemfasciatus C. & V.
39. Archamia lineolata (C. & V.). Syn. Apogon argenteus Valenciennes.
40. Zoramia graeffii (Günther). Syn. Amia nematacantha Ogilby.

Family xx. EPINEPHELIDAE.

41. Epinephelus maculatus (Bloch). Syn. Serranus gaimadi C. & V.
42. Epinephelus fuscoguttatus (Forskal).
43. Epinephelus merra Bloch.
44. Cephalopholis argus Bloch & Schneider.
45. Cephalopholis urodelus (C. & V.).

Family xxi. SILLAGINIDAE.

46. Sillago sihama (Forskål). Syn. Sciaena malabarica Bloch & Schneider.

Family xxii. LUTPANIDAE.

47. Lutjanus vitta (Quoy & Gaimard).
48. Lutjanus flavipes (C. & V). Syn. Diacope aurantiaca C. & V. and D. analis C. & V.
49. Lutjanus caudalis (C. & V.).
50. Lutjanus marginatus (C. & V.). Syn. Diacope xanthopus C. & V. and D. axillaris C. & V.
51. Lutjanus semicinctus Quoy & Gaimard.
52. Lutjanus fulviflamma (Forskål). Syn. L. unimaculatus Quoy & Gaimard.

Family xxiii. CAESIONIDAE.

53. Caesio maculatus C. & V.
54. Caesio caerulaureus Lacépède.

Family xxiv. POMADASIDAE.

55. Plectorhinchus punctatus (C. & V.).
56. Scolopsis temporalis (C. & V.).
57. Scolopsis cancellata Raffles.
58. Scolopsis ciliata (Lacépède). Syn Scolopsides lycogenis C. & V.

Family xxv. NEMIPTERIDAE.

59. Nemipterus marginatus (C. & V.).

Family xxvi. PEMPHERIDAE.

60. Pempheris vanicolensis C. & V.

Family xxvii. MULLIDAE.

61. Mulloides vanicolensis (C. & V.).
62. Mulloides samoensis Günther.
63. Pesudupeneus indicus (Shaw).

Family xxviiiKYPHOSIDAE.

64. Kyphosus lembus (C. & V.).

Family xxix. MONODACTYLIDAE.

65. Monodactylus argenteus (Linnaeus). Syn. M. falciformis Lacépède and Psettus commersonii C. & V.

Family xxx. CARACANTHIDAE.

66. Caracanthus (Amphiprionichthys) unipinna (Gray).

Family xxxi. SCORPAENIDAE.

67. Pterois volitans (Linnaeus).

Family xxxii. PLATYCEPHALIDAE.

68. Platycephalus punctatus C. & V.

Family xxxiii. CHAETODONTIDAE.

69. Chaetodon vagabundus Linnaeus.

Family xxxiv. ACANTHURIDAE.

70. Teuthis triostegus (Linnaeus).
71. Teuthis, new species.
72. Teuthis lineatus (Gmelin).
73. Callicanthus lituratus (Bloch & Schneider).
74. Ctenochaetus ctenodon (C. & V.).

Family xxxv. SIGANIDAE.

75. Siganus lineatus (C. & V.). Syn Teuthis flava De Vis and Siganus aurolineatus Ogilby (types in Queensland Museum seen).
76. Siganus doliatus (C. & V.).
77. Siganus margaritiferus (C. & V.).

Family xxxvi. ZANCLIDAE.

78. Zanclus canescens (Linnaeus). Syn. Zanclus centrognathos C. & V.

Family xxxvii. POMACENTRIDAE.

79. Pomacentrus vanicolensis C. & V.
80. Pomacentrus tripunctatus C. & V.
81. Pomacentrus pavo (Bloch). Syn. P. notatus De Vis.
82. Glyphisodon antjerius C. & V.
83. Glyphisodon septemfasciatus C. & V.
84. Glyphisodon bengalensis (Bloch).
85. Glyphisodon zonatus C. & V.
86. Glyphisodon uniocellatus Quoy & Gaimard. Syn. Abudefduf taupou Jordan & Seale.
87. Amphiprion perculà (Lacépède). Syn. A. tunicatus C. & V.

2 Kindly identified by Dr. Kamakichi Kishinouye, Tokyo.

88. Chromis ternatensis Bleeker.

Family xxxviii. CORIDAE.

89. Cheilio inermis (Forskål). Syn C. viridis C. & V.
90. Halichores trimaculatus (Griffith).
91. Halichores margaritaceus (C. & V.).
92. Halichores papilionaceus (C. & V.).
93. Novaculichthys taeniourus (Lacépède). Syn. Julis vanikorensis Quoy & Gaimard=Xyrichthys vanicolensis C. & V.
94. Cheilinus rivulatus C. & V.

Family xxxix. ELEOTRIDAE

95. Eleotris fuscus (Bloch & Schneider).
96. Valenciennea muralis (C. & V.).
97. Ophiocara porocephala (C. & V.). Syn. Eleotris margaritaceus C. & V.
98. Hypseleotris vanicolensis (Sauvage).

Family xl. GOBIIDAE.

99. Gobius elegans C. & V.
100. Zonogobius semidoliatus (C. & V.).
101. Amblygobius phalaena (C. & V.).
102. Periophthalmus argentilineatus C. & V.

Familyxli. BLENNIIDAE.

103. Salarias, new species.
104. Salarias guttatus C. & V.
105. Salarias periophthalmus C. & V.
106. Salarias fasciatus (Bloch). Syn. S. quadripinnis C. & V.
107. Salarias rivulatus (Rüppell). Syn. S. quadricornis C. & V. and Salarias atratus Macleay.
108. Salarias lineatus C. & V.

Family xlii. CARAPIDAE.

109. Carapus parvipinnis (Kaup).
110. Carapus homei (Richardson).

Family xliii. BALISTIDAE.

111. Balistapus lineatus (Bloch & Schneider). Syn. Balistes sesquilineatus Lay & Bennett.
112. Balistapus aculeatus (Linnaeus).

Family xliv. TETRAODONTIDAE.

113. Tetraodon hispidus Linnaeus. Syn. Tetrodon implutus Jenyns.

Family xlv. OSTRACIIDAE.

114. Ostracion sebae (Kaup).

All these species are marine fishes, with the exception of *Anguilla mauritiana*, *Kuhlia marginata* and *K. rupestris* which live in fresh water at least for the greater part of their lives, and the amphibious *Periophthalmus argentilineatus* which lives amongst mangroves. Some of the Eleotridae may be found in fresh water. *Amphiprion percula* hides in the folds of large sea anemones whilst *Carapus parvipinnis* is parasitic in sea-cucumbers. Two specimens of *Carapus homei* were found in the ambulacral grooves of a starfish.

The fish-fauna of the Santa Cruz Islands bears a marked resemblance to that of the East Indies and Samoa.

The Amateur Radio Scientist in the Pacific

By J. E. STRACHAN
At the Pan-Pacific Research Institution,
Honolulu

I belong to the Amateur Division of Scientific Students, and have been interested for a good many years in what we call "wireless," and what you call "radio," latterly more particularly in that branch of radio which makes use of the so-called high frequency waves and which enables one, with very little power, to enter into communication with practically the whole earth.

Radio, of course, in a broad sense, is not a new thing. It is quite as old as the world, and I think the layman can best understand it by being told that radio is a method of using invisible light waves as a means of communication. We have, right down through the ages, depended upon visible light waves to inform us of the nature of the universe in which we live. I need not emphasize the fact that most of the knowledge which we possess of the physical universe today, and most of our understanding of it, is derived through the medium of light. It is only natural, therefore, that an explanation of the domain of, or some knowledge of the facts about invisible light, should increase our means of discovering new and additional facts about the universe.

Our knowledge of the physical uni-

verse, such as it is, is confined almost entirely to what we call "moving matter". That is the one fundamental fact of our physical experience in life, matter in motion, not matter itself but matter in motion, and we have called matter in motion "energy." It may be possible to give a perfectly complete, consistent, and coherent account of the universe in terms of moving matter. I don't know whether Einstein has succeeded in doing so or not, but most people feel that an explanation of what is happening in the universe confined to such terms as "moving matter" is incomplete and leaves gaps; in other words, that there is another kind of happening in the universe beyond our experience but arrived at by a process of reasoning or inference.

And so it has been assumed that there are two forms of energy—the energy of moving matter and some other kind of energy, and recent discovery tends to show that they are interchangeable, or that the two together make up the sum total of the physical universe as we know it.

We have arrived at that conclusion largely because of the necessity of correlating phenomena which we perceive at different points in the time-place complex. Thus on the earth we perceive a phenomenon of a moving-matter type, and correlate it with a similar phenomenon on the sun, and one naturally asks what is happening in the gap between. Einstein and the relativists may not feel there is any necessity of filling up that gap in between, but those of us who cannot grasp the Einstein philosophy are content to accept the theory of ether waves.

Radio is something everybody nowadays looks upon as a commonplace, having been introduced to it through the development of broadcasting. That aspect of wireless is now of immense importance, and you g e n t l e m e n have been d i s c u s s i n g some possibility of reaching the public through the medium of the broadcasting service. But for those who are students of wireless, experimentation in short waves offers much more interest, in the first place, because there are so many unsolved problems about it, and secondly, because it is within the reach of all. I would just like to emphasize at this point the fact that a new element has really come into our social life through the development of short wave, low power radio. That has come because of the fact that no longer is a large and powerful and expensive equipment necessary to make use of wireless as a means of communication. Young boys at school, or who have just left school, are able, at very little expense, or trouble, to make for themselves apparatus which will put them in touch with all the islands and countries of the Pacific. Surely that is going to have a very important influence upon the development of the world, whether for good or evil, it is perhaps too soon to say. I think the chances are it is going to prove a powerful factor in bringing about better understanding among the people of the world. Never before in the history of the world have individual people of the various countries been able to get in instant direct touch with each other. There is no official organization or monopoly to consult in the matter. I think that is going to have a very powerful effect upon social development in the future.

I spoke about the fact that these short waves were very mysterious. We cannot send one out and see what happens to it, but extraordinary results have been got through the use of the short waves, which have led to the supposition that they do not slide around the surface of the earth, neither do they travel through the earth, but they move tangently from the point of origin and are reflected from the concave reflector of ionized air that we believe to exist above the surface of the earth. So they come back to the earth with a

very definite skipped distance between the transmission station and the receiving station. There is no organization that can adequately investigate this except the Amateur Transmitters of the World. It would require a world-wide organization, and there is no such organization except the Amateurs, who are very busy at the present time investigating the peculiarities of the travel of these short waves.

Member: How do you produce these short waves?

Mr. Strachan: The apparatus is a very simple one, and consists of a vacuum tube quite similar in its construction to the vacuum tubes used in the receiving set but usually made a little bigger and capable of handling a little more energy than the receiving tube. The receiving tube, however, has been used for this purpose. This tube is coupled up to a coil of wire, 6 or 8 or 10 turns of about three inches diameter. There are always two circuits coupled with a valve, viz: the input-circuit and the output-circuit. The output connects the plate with the filament of the valve while the input circuit connects the grid with the filament. If these two are coupled together it is possible to get the tube in an unstable condition so that the current passing through it becomes oscillatory in character. It is practically an alternating current of very high frequency.

The wave length or frequency is determined by the capacity and electrical inertia of the circuit in the same way that a receiving set is tuned.

In a receiving set a battery will serve to light the filament that supplies the electrons. The power is supplied by a small dry battery of perhaps 90 volts. For transmitting it is better to have a higher voltage, so most amateurs use a step-up transformer connected with the power mains. That current should be rectified. Others use a motor generator. The object is to put a direct voltage of from 500 to 2000 on the plate of the tube. The tube circuits are connected up, either directly or indirectly, to a short aerial and counterpoise, virtually two aerials whose lengths bear a simple relationship to the wave length of transmission. In the circuit there are several points that may be controlled by means of a Morse Key, or by microphone. It is a very simple appartus of one tube, one coil, and one tuning condenser. I have myself used a five-watt tube to communicate from New Zealand to France.

Dr. Larsen: Why is it we have such a hard time here getting broadcasting stations in the States?

Mr. Strachan: Because of the comparative inefficiency of the longer waves. It is one of the mysteries of the short waves that they are so inefficient at long distance.

Another of the questions being investigated by the Amateurs at present is the difficulty of communicating between certain points. In New Zealand, for example, dozens of us have had no trouble in communicating with the whole world with the exception of South Africa. South Africa cannot hear us and we cannot hear them. We have been easily able to get South America. A great circle from New Zealand to South Africa passes nearly over the Magnetic Pole. This may have something to do with it. On one occasion I got in touch with the University of Tomsk in Siberia, who asked me to get in touch with New York. I did so. So far as I can find out he never did communicate with New York stations directly although I heard him calling them night after night. He would have to relay to get New York. I am wondering whether there was not a similar trouble there through the North Magnetic Pole.

Long distance daylight communication is very difficult but on one occasion I had to communicate every night for a week with New York on account of Dr. Condliffe, and I got a letter

from a young man in England who reported the communication from both ends and said it was about mid-day there. That was in England; I was down in New Zealand talking to New York.

Telephoning requires a great deal more energy, but a friend of mine, to whom I was speaking last night in New Zealand, has succeeded in putting his voice into the middle States, using 7½ watts power. The apparatus consisted of a coil of wire the size of half a dollar and the ordinary microphone such as you use in any telephone here. He had that connected up with the aerial. They had not arranged telephony at the other end, but keyed a message back.

Mr. Moe: Would you say that the voice could be transmitted just as readily on the short wave as the code?

Mr. Strachan: Yes, with about ten times the power. Most of us today hold world-wide communication on a 50-watt tube using the key.

Mr. Tinkham: How does altitude affect broadcasting? Do you reach high stations?

Mr. Strachan: We have never been able to make any distinction. I think about 20,000 people in the States are using these short waves. The code may ultimately be superceded by the voice. The short wave stations are growing very, very rapidly. The Amateurs were given the short wave because it was thought not efficient. Now that we have found out what can be done, the Navy and others are using it. I think you should use your influence to see that some room is left for the Amateur men in this respect, because there is something in the fact that they are communicating without passing their messages through official channels where censorship can destroy the good that might be done. I think a small short wave band should be left exclusively to the Amateurs. They only want a wave band of perhaps two or three meters.

Question: If the Amateur band ran from 27 to 30 meters, would that not interfere in any way with, say, 32 or 26?

Mr. Strachan: Not in the least. The American law has been very reasonable. So far different waves have been definitely allocated to the Amateurs.

Mr. Moe: That would mean that the nations would have to cooperate. Is there a combination that can put over such a program?

Mr. Strachan: There is an excellent world-wide Amateur association, The International Amateur Radio Union.

Mr. Moe: Would you advise all Amateurs to learn the code?

Mr. Strachan: Yes.